

DMA Toolkit

Section I

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**Idaho Direct Mathematics Assessment
K-12 Toolkit
State Department of Education**

PURPOSE STATEMENT

The purpose of the *Idaho Direct Mathematics Assessment (DMA)* is to measure Idaho students' mathematical problem-solving skills, including their ability to apply skills learned in alignment with the Idaho Math Achievement Standards to problem-solving situations. Problem solving is valued as an essential tool for success in a complex, modern world. The DMA will provide valuable information about students' basic skill levels and their ability to effectively apply and communicate about mathematical processes and strategies, creative thinking, and decision making. The data collected as a result of this assessment will assist in the development of curriculum and instructional strategies for teachers, and will improve student achievement.

About the Assessment

Of the five test items included in each assessment, most will begin with a problem situation followed by a series of related questions. All students are required to solve the first test item located on the front-page. This test item is designed to assess broad-based problem-solving strategies using basic computation skills.

On the remaining three pages of the assessment, students will select three of the four remaining test items. These test items cover a wide range of identified content strands. This allows students to choose test items that best demonstrate their mathematical abilities. A list of the content strands and the mathematical terms and vocabulary that may be included on the assessment can be found in Section III of the DMA Toolkit. The Idaho K-12 Mathematics Achievement Standards with specific grade level Content Knowledge and Skills are in the Appendix.

The test items are targeted for students performing at grade level. Some portions of a test item may be designed for students to demonstrate advanced thinking skills. Thus, there may be portions of some test items that all students will not complete. This will not necessarily prevent them from receiving a proficient score on the Direct Mathematics Assessment.

Introduction

Assessment is one of the guidance systems of education. Assessment, to be fully utilized, must advance education by:

- measuring what students know--record the status of education
- expressing what students should know--support curriculum goals
- enhancing learning
- providing insight for how curriculum should be taught--support good instructional practices

The use of standardized tests such as the Idaho Standards Achievement Test (ISAT) and the Direct Mathematics Assessment (DMA) allow us to measure mathematics skills. In addition, the DMA has been developed to support Idaho's instruction and curriculum goals in mathematics. The ISAT and the DMA are complementary assessments that meet different needs:

Standardized Tests such as the ISAT

- reflect state and national standards
- measure skills
- provide a measure of student growth in math skills over the years

Standardized Tests such as the DMA

- reflect goals and curriculum objectives as established by the State of Idaho
- assist in building conceptual bridges between skills and processes
- measure a student's demonstrated
 - ability to solve problems and select appropriate processes
 - level of thinking and cognitive development
 - communication of mathematical processes and strategies
 - accuracy
- encourage creative thinking, decision-making, and mathematical application and connections
- provide a mechanism to improve instruction by analyzing student results

In the final analysis, this Idaho Direct Mathematics Assessment is a means to improve instruction and student achievement. This Toolkit has resources available specific to 4th, 6th and 8th grades, as well as 10th grade. However, these resources may be adapted and adjusted for all students in any grades K-12.

Process of DMA development

- emphasizes cognitive development, synthesization of knowledge of basic skills, accuracy, and ability to apply information through problem solving
- assesses concepts and skills selected from a provided list

Expected technology

- 4th grade--no calculators
- 6th grade—calculator availability expected
- 8th grade--calculator availability expected
- 10th grade-- calculator availability expected (this assessment is not currently administered...sample assessment only)

Process of DMA scoring

- assesses problem solving skills--did the student:
 - understand problem
 - select an appropriate strategy
 - show willingness to consider different strategies
 - use a systematic process
 - show perseverance
 - check work/justify answer
 - accurately solve the problem
- evaluates student performance holistically using a scoring standard
- emphasizes process and justification of answers
- accepts multiple appropriate processes and solutions

DMA Validity and Reliability

- The State Department of Education has contracted with the Northwest Regional Educational Laboratory to review and monitor DMA validity and reliability
- The State Department of Education closely monitors Idaho Mathematics Achievement Standards alignment consistency and inter-reader scoring reliability

Direct Assessment Terms and Definitions

THE ASSESSMENT

Direct or performance assessments enable students to demonstrate knowledge by using it effectively to create a product, solve a problem, or complete a task. A direct assessment differs from a conventional test in the same way a written test of driving rules differs from an on-the-road driving test, which replicates typical daily driving.

A **prompt** is a directive to a student to undertake a performance or task. A prompt typically includes a short vignette and questions or tasks related to the information in the vignette.

SKILLS

Open-ended thinking involves responding to a problem with either many possible correct answers, or one in which the best answers can be obtained in many ways. Open-ended responses are not simply a matter of taste, but are based on the logical soundness of a viewpoint, as well as whether they meet selected standards.

Descriptors are sets of indicators to help determine a student's level of achievement in a direct assessment. Descriptors direct scorers where to look within an assessment in order to make the best judgment or evaluation. Descriptors empirically describe traits of work, which scorers do and do not value. (i.e., processes, strategies)

Process refers to steps a student takes to reach an answer, and may include strategies, decisions, reasoning, and communication. Assessing processes requires scorers to explicitly judge beyond what can be inferred from the end product. Scorers must, however, keep in mind the importance of determining whether a final product or performance meets required standards.

Traits are more specific details to help judge a performance or assessment. (i.e., computation, labels)

SCORING

Scoring standards or rubrics provide guidelines to assist in determining scores. Scoring standards list descriptors, describe traits assessed, and help scorers assign the product to a scale using terms that summarize indicators of work.

Anchor papers or main range finders provide a mid-range sample (not high, not low) of each level of performance on the scoring scale.

Holistic scoring is based on an overall impression of an assessment. Scorers attempt to match an overall impression to point scale descriptors to determine a final score.

Point scales enable comparisons, but also summarize the most telling and important hallmarks within a range. Unlike conventional tests that rate students on a 100-point scale (usually percent correct), performance assessments typically use a four-, five-, or six-point scale.

Calculator Usage

Idaho Mathematics Achievement Standard: The appropriate use of technology is encouraged in the classroom.

Sixth & Eighth Grade: Calculators will be expected to be available for students to use on the DMA.

These assessments are designed with real-life problems and this can be more effectively assessed when students do have access to calculators. Districts should ensure that a calculator is available for each student to use while taking this assessment. Students are allowed to use any model or type of calculator.

The use of calculators has made it possible for assessments to use realistic data, and solutions are designed to have decimal and fraction answers. Students must decide when and how to use values and apply appropriate operations. Prompts have more intense problems that can be solved by a greater variety of mathematical techniques. Given the more diverse and technical problems, it may be difficult for a student to complete the assessment in the allowed time without the use of a calculator.

Fourth Grade: Calculators will not be allowed on the DMA.

The fourth-grade assessment will be purposely designed so that calculators will not be necessary. Therefore, calculators will not be used on the fourth-grade assessment.

The use of a calculator is still appropriate in the fourth-grade classroom (i.e., number patterns, guess and check, real-life applications, and investigations).